

ALTAI WILD RYEGRASS



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A PASTURE GRASS FOR FALL AND WINTER

Altai wild ryegrass is especially useful for fall and winter pasture. This grass is a long-lived perennial with a well developed root system which is somewhat rhizomatic. It can penetrate 3–4 m (10–14 ft) deep and can utilize moisture above and from a perched (high) water table at this depth. It is tolerant of cold, drought, and saline conditions. Altai wild ryegrass cures well in the field and retains most of its nutritive value throughout the summer and early fall. Because of its erect form of growth it projects above shallow snow and stays erect in deep snow, allowing the snow to bridge over the top of the leaves so that they are still readily accessible to grazing cattle.

Points to remember:

- Prairieland is the recommended cultivar.
- For pasture, seed in the spring in a well-prepared seedbed, or in the late fall into stubble that has been sprayed with 2,4-D for control of winter annuals. Seed at 60–100 seeds/m (39.4 in.) of row and at 2–3 cm ($\frac{3}{4}$ –1 in.) deep. In dry areas, space the rows 45–90 cm (18–36 in.) apart; in moist areas, 30–45 cm (12–18 in.) apart.
- Seed a legume such as Drylander or Rambler alfalfa with Altai wild ryegrass.
- When grown for seed, Altai wild ryegrass is an ideal dual-purpose crop because the aftermath provides a nutritious pasture for late fall and winter.
- For a seed crop, drill the seed at 4.5 kg/ha (4 lb/ac) in rows 90 cm (36 in.) apart, provide adequate fertilizer and remove the aftermath by grazing or cutting.
- Harvest the seed in the late-milk to firm-dough stage.
- Metric weights and measures are used in this publication. The following conversion factors may be helpful: $\text{kg} \times 2.205 = \text{lb}$, $\text{ha} \times 2.471 = \text{ac}$, $\text{kg/ha} \times 0.892 = \text{lb/ac}$, $\text{cm} \times 0.394 = \text{in.}$ and $\text{m} \times 1.094 = \text{yd}$.



ALTAI WILD RYEGRASS

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Altai wild ryegrass, *Elymus angustus* Trin., was introduced from Siberia by the Central Experimental Farm, Ottawa, Ont., in 1934. It was first grown at the Research Station, Swift Current, in 1950, and was distributed from there to seed growers in Western Canada in 1976. It is an excellent pasture grass that extends the grazing season into the fall and early winter in the southern Canadian prairies. Its good curing qualities and erect growth make it especially useful for late fall and winter grazing. The aftermath from seed production is nutritious and can be used for fall and winter pasture.

Altai wild ryegrass is a winter-hardy, drought-tolerant, long-lived perennial grass. The coarse, erect basal leaves vary from light green through blue green to blue. The seed heads, 15–20 cm (5–7 in.) long, are borne on nearly naked culms 60–120 cm (2–4 ft) long. The seed is about three times as large as that of Russian wild ryegrass (Fig. 1) and can emerge from deeper seedings (Table 1). The seedlings grow more slowly than those of crested wheatgrass and, even though it has a large seed, depth controls must be used during seeding to prevent planting too deeply. The root system of Altai wild ryegrass is unique among the adapted cultivated grasses because it can penetrate 3–4 m (10–14 ft) deep and can use moisture to that depth (Fig. 2).

TABLE 1. Percentage of emergence of four grasses from four depths of seeding in the greenhouse

Grass species	Depth of seeding			
	3 cm (1.2 in.)	5 cm (2.0 in.)	7 cm (2.7 in.)	9 cm (3.5 in.)
Altai wild ryegrass	85	75	58	40
Russian wild ryegrass	78	54	10	2
Bromegrass	89	73	33	5
Tall wheatgrass	86	57	15	3

ADAPTATION

Altai wild ryegrass is native to western Siberia and the Altai mountain region between Siberia and Mongolia. It thrives on

semideserts and steppes and seems to grow well on saline soils. No cultivars have been reported from the USSR.

In Canada, Altai wild ryegrass is well adapted to the loam and clay soils of the prairies in Saskatchewan, Alberta, and Manitoba. Its deep root system penetrates the soil to 3.5 m (12 ft) or deeper and is capable of using water at greater depths than most grasses. Tests in a greenhouse have shown that Altai wild ryegrass is almost as tolerant of salinity as is tall wheatgrass (Fig. 3).

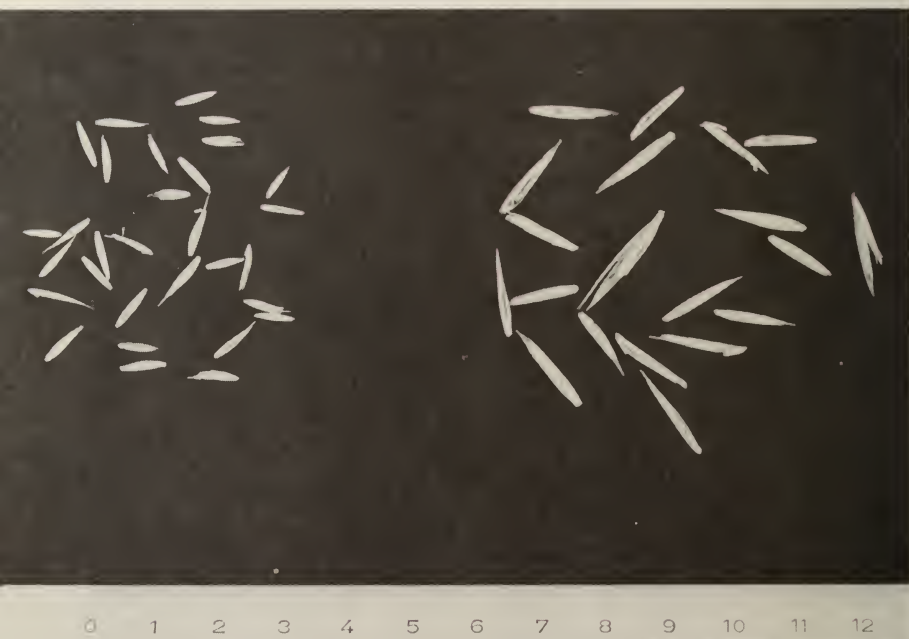
CULTIVARS

Prairieland, the recommended cultivar, was developed at the Research Station, Swift Current. It is the only known cultivar.

UTILIZATION AND MANAGEMENT FOR PASTURE

Altai wild ryegrass is especially valuable for fall and winter pasture because it retains its nutritive value better than other grasses. It is similar to Russian wild ryegrass in its ability

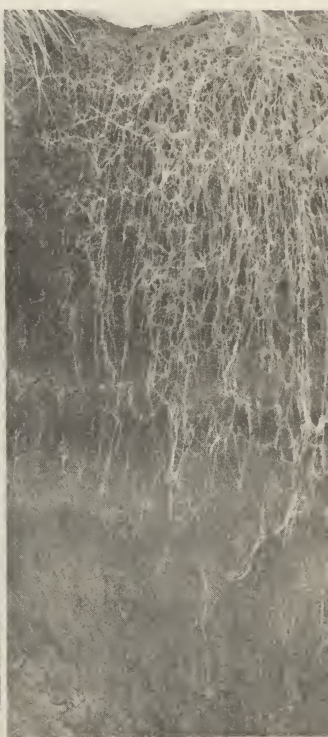
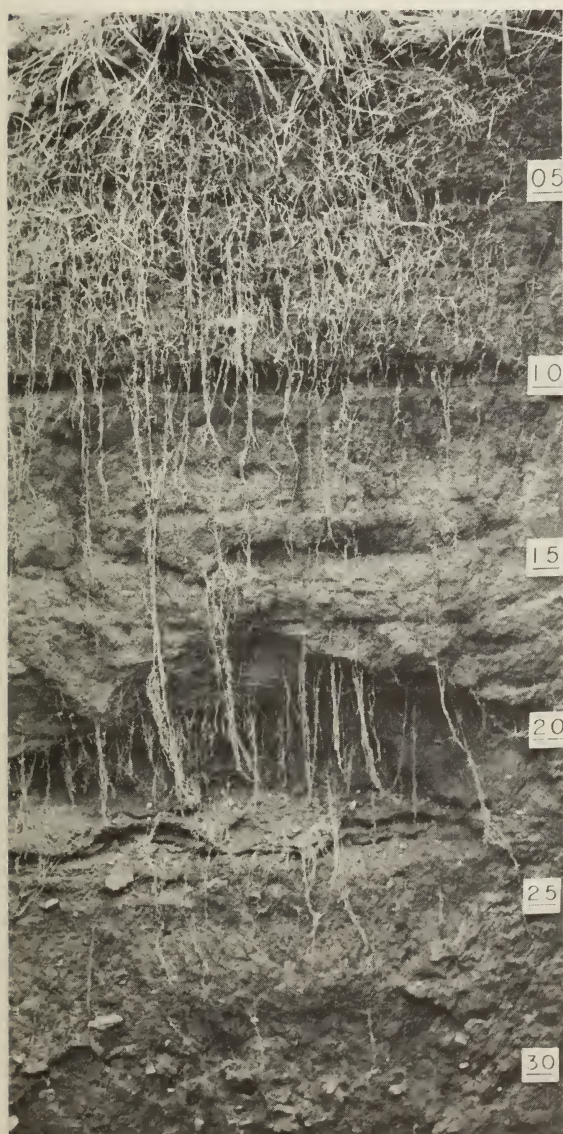
Fig. 1. Seed of Russian wild ryegrass (left) and Altai wild ryegrass (right). Rule is in centimetres.



to recover after grazing when moisture is adequate and it has a long period of growth commencing in early spring and continuing into late fall. It is not recommended for hay.

The ability of the deep root system of Altai wild ryegrass to penetrate 3–4 m (10–14 ft) deep and to use water from

Fig. 2. Depth of root systems of Altai wild ryegrass (left), and Russian wild ryegrass (right), in metres.



a perched (high) water table is shown in the comparative carrying capacities of pastures seeded on a perched water table area given in Table 2.

TABLE 2. Comparative carrying capacities and liveweight gains of cattle on pastures seeded to three grasses in rows 90 cm (36 in.) apart at two locations grazed during September and October for 6 yr

	Perched (high) water table 3.7–4.3 m (12–14 ft) deep		
	Altai wild ryegrass	Russian wild ryegrass	Green needle- grass
Carrying capacity, animal unit days/ha (/ac)	215 (87)	87 (35)	87 (35)
Animal liveweight gains, kg/ha (lb/ac)	70 (62)	43 (38)	47 (42)
	Dryland		
	Altai wild ryegrass	Russian wild ryegrass	Green needle- grass
Carrying capacity, animal unit days/ha (/ac)	96 (39)	82 (33)	69 (28)
Animal liveweight gains, kg/ha (lb/ac)	46 (41)	46 (41)	40 (36)

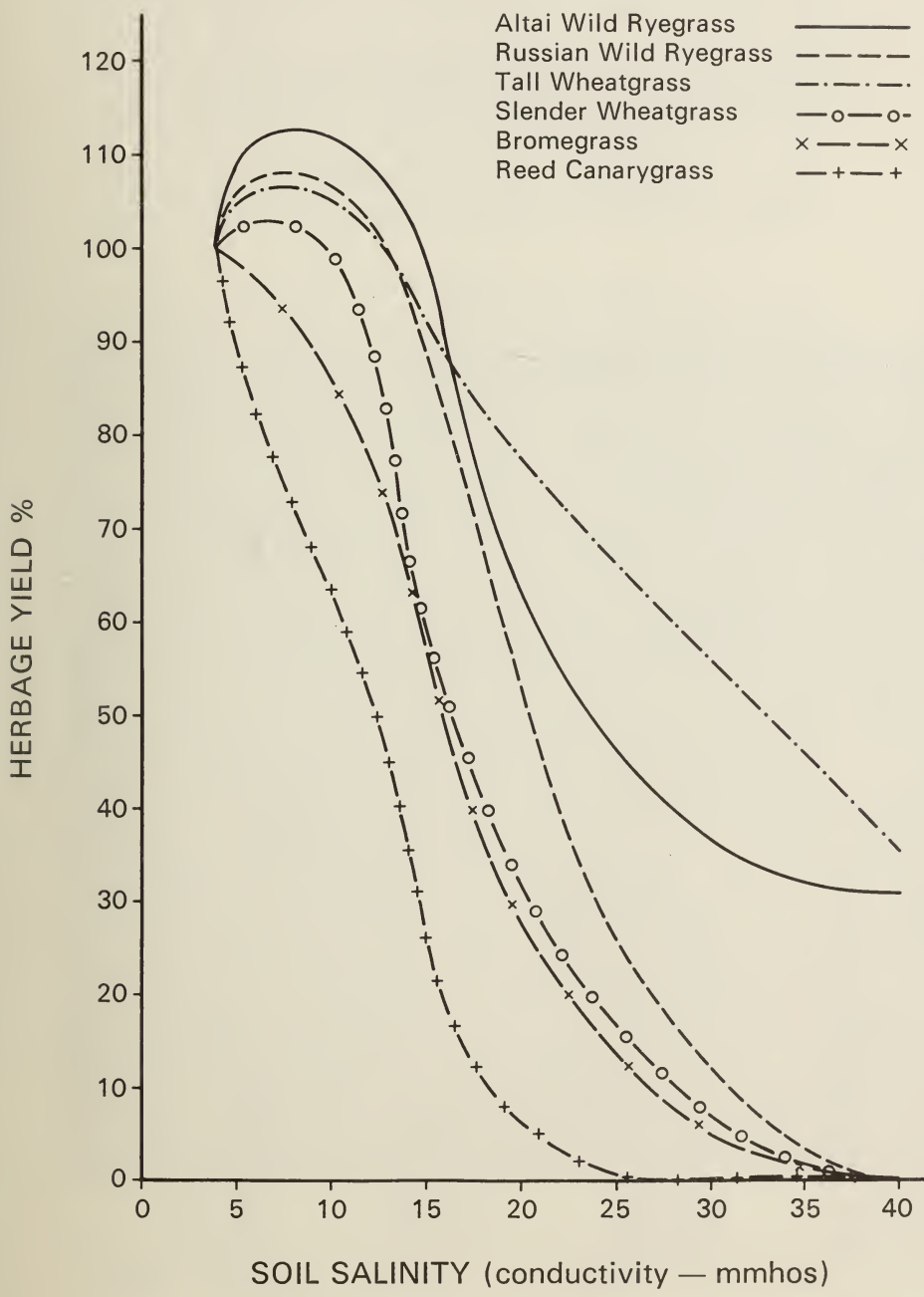
In a palatability test of four grasses grazed by sheep, Altai wild ryegrass, despite its coarseness, appeared to be eaten as readily as crested wheatgrass and intermediate wheatgrass.

A digestibility trial of aftermath forage harvested in August from a seed-increase field of Altai wild ryegrass showed that it compares favorably with oat-alfalfa hay for digestibility and it was accepted just as readily (Table 3).

TABLE 3. Digestibility by lambs of Altai wild ryegrass seed field aftermath compared with digestibility of an oat-alfalfa hay

Feed	Dry matter digestibility %	Dry matter daily consumption g/day (lb/day)	Lamb gain g/day (lb/day)
Altai wild ryegrass	64.5	643 (1.42)	91 (0.20)
50% oat, 50% alfalfa	65.9	609 (1.34)	68 (0.15)

Fig. 3. Herbage yield of six grasses at varying levels of soil salinity as a percentage of the yield of each grass grown on a nonsaline soil.



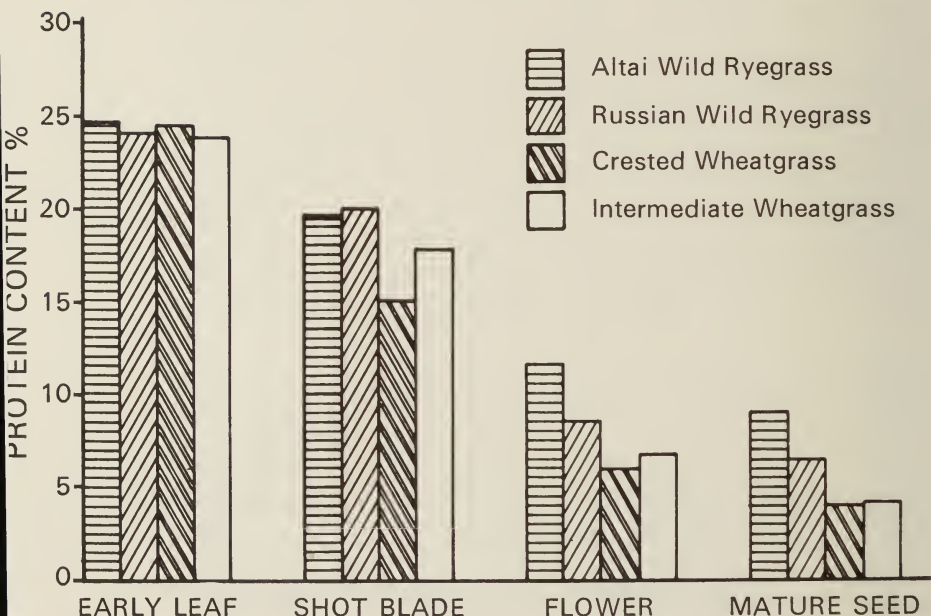
The ability of Altai wild ryegrass to retain a high nutritive value throughout the summer and fall is shown in the chemical composition of the forage at various stages of development (Fig. 4) and in the animal performance on fall pastures (Table 4 and Fig. 5).

TABLE 4. Three-year average performance of cows on Altai wild ryegrass (AWR) pasture during the fall and winter

	Fall (Sept. & Oct.) Yearling heifers	Winter (Nov., Dec., & Jan.) Pregnant cows		
	AWR alone	AWR alone	AWR + 0.9 kg (2 lb) oats/day	AWR + 2.3 kg (5 lb) oats/day
Gain/animal per day, kg (lb)	0.54 (1.19)	-0.70 (-1.54)	-0.03 (-0.07)	-0.02 (-0.04)
Grazing animal days/ha (ac)	800 (324)	654 (265)	654 (265)	654 (265)

In a study of winter grazing, pregnant cows were grazed on a pasture of Altai wild ryegrass seeded in rows spaced 90 cm

Fig. 4. The percentage protein content of four grasses at four stages of maturity in the first crop year when heading of all species was quite profuse.



(36 in.) apart (Fig. 6). Three groups of four cows were used: one group was provided with Altai wild ryegrass pasture; the second was provided with Altai wild ryegrass pasture, supplemented with 0.9 kg (2 lb) chopped oats/animal per day; and the third with pasture plus 2.3 kg (5 lb) of chopped oats/animal per day. The cows had access to shelter, water, and salt, but no other supplements. Over a 3-yr period, the cows maintained their weight through November, December, and January when the pasture was supplemented with oats, even at the low level, but they lost weight at 0.7 kg (1.5 lb)/animal per day when grazing only Altai wild ryegrass (Table 4). The erect, stiff basal leaves of Altai wild ryegrass projected

Fig. 5. Cattle grazing aftermath forage of seed production field in October.



above shallow snow and remained erect in the deep snow forming a bridge across the plants and allowing the cattle to remove the snow with their muzzles and graze the foliage underneath.

Land preparation and seeding

Early spring and late fall are the best times to seed Altai wild ryegrass. For spring seeding prepare a firmly packed seedbed to ensure shallow seeding. Even though Altai wild ryegrass has a large seed and can emerge better from deeper seedings than many other grasses, it is wise to attach depth controls to the drill discs to ensure seeding uniformly and shallowly at 2–3 cm ($\frac{3}{4}$ –1 in.) deep. Because Altai wild ryegrass seedlings develop slowly, it is important to destroy weeds either by cultivating or with the use of herbicides before seeding. After the grass has developed beyond the three-leaf stage, you may need to control weeds by using the herbicide again. Because alfalfa is sensitive to certain herbicide formulations, consult your agricultural representative or provincial authorities on which product is most suitable for your needs.

Fall seeding should be done after mid-October in weed-free stubble. Spray the stubble field with a herbicide either just before or soon after seeding for the control of winter annual weeds, such as flixweed, stinkweed, and narrow-leaved hawk-beard, which would reduce the stands of fall-seeded forage crops through competition the next spring. Spraying is more effective than cultivating because it leaves a firm seedbed and the stubble, which traps the snow and ensures a better moisture supply for early germination.

Row spacing, seeding pattern, and use of fertilizer

Moisture is the principal factor limiting forage production in most areas where Altai wild ryegrass is grown. To reduce the limiting effects of low precipitation and high evaporation, adjust the number of plants to suit the available moisture. The easiest way to do this is to change the spacing between the rows. For the dry southern prairies use row spacings of 60–90 cm (24–36 in.) and for the moister locations use spacings of 30–45 cm (12–18 in.).

To increase pasture production without the use of expensive fertilizer, include alfalfa with Altai wild ryegrass for seeded pastures. Use alternate rows or a cross-seeded pattern to increase production over a mixed grass-alfalfa stand (Table 5). Most grasses are very competitive with alfalfa when they are seeded in a mixture, but alfalfa persists longer in a stand if seeded in alternate rows or across the grass rows. The cross-seeded pattern has the additional advantage of forming

Fig. 6. Deep snow bridged over the top of the erect leaves of Altai wild ryegrass which are still accessible to grazing cattle. Bottom picture shows area where cattle have removed the snow to graze the grass.



small pockets to reduce runoff and water erosion. Also, cross-seeding offers the opportunity of seeding the grass at the correct seeding rate in one direction and the alfalfa at its correct seeding rate in a second seeding, either diagonally or at right angles to the rows of grass.

TABLE 5. Influence of seeding pattern on yield of grass and alfalfa, as shown by the 5-yr mean dry matter yield from various seedings as a percentage of the yield from 30 cm (12 in.) mixed rows

	Dry matter yield %
30-cm (12-in.) mixed rows	100
60-cm (24-in.) mixed rows	121
90-cm (36-in.) mixed rows	129
30-cm (12-in.) crossed rows	119
60-cm (24-in.) crossed rows	136
90-cm (36-in.) crossed rows	125
30-cm (12-in.) alternate rows	126
60-cm (24-in.) alternate rows	134
90-cm (36-in.) alternate rows	103

Because Altai wild ryegrass has a large seed it has fewer seeds per kilogram (or pound) than many other grasses such as Russian wild ryegrass and crested wheatgrass. Therefore, it requires a greater weight of seed to plant a given area at an equivalent rate. Seeding at 60–100 seeds for each metre (39.4 in.) of the row uses about 4.5 kg of seed/ha (4 lb/ac) for rows 90 cm (36 in.) apart and 13.5 kg/ha (12 lb/ac) for rows 30 cm (12 in.) apart.

Fertilizer is not usually needed in Brown and Dark Brown soils when a legume is included in the pasture, although some stands respond to the addition of phosphorus. When grass is grown alone, be sure to have the soil tested to determine if fertilizers are needed.

Management for seed production

The seed yield of Altai wild ryegrass is low in comparison to the seed yield of most other grasses. The problem of low yield is aggravated by the large size of the seed, which means fewer seeds per kilogram and, as a result, high seeding rates. A lack of good seed production has delayed the rapid introduction of this grass into commercial agricultural production.

Seed production studies at the Research Station, Swift Current, have shown the management practices that give the best seed yields. Row spacings of 90 cm (36 in.) apart result in higher

seed yields than closer row spacings. The 6-yr mean seed yields obtained from Altai wild ryegrass sown in various row spacings were:

Row spacing	Seed yield kg/ha (lb/ac)
30 cm (12 in.)	57 (51)
60 cm (24 in.)	102 (91)
90 cm (36 in.)	156 (139)
120 cm (48 in.)	170 (152)
150 cm (60 in.)	176 (157)

Use of fertilizer did not produce a significant increase in the seed yield of Altai wild ryegrass, although good fertility is an obvious requirement. The 6-yr mean seed yields obtained from Altai wild ryegrass seeded in rows 90 cm (36 in.) apart and given various annual fertilizer applications were:

Fertilizer kg/ha (lb/ac)	Seed yield kg/ha (lb/ac)
N-P	
0-0	110 (98)
25-0 (22.3-0)	126 (112)
25-25 (22.3-22.3)	144 (128)
50-0 (44.6-0)	133 (119)
50-50 (44.6-44.6)	148 (132)

The leafy residue remaining after the seed has been harvested is nutritious and makes excellent feed for livestock. Experiments at Swift Current showed that removal of this aftermath forage is essential to maintain maximum seed yields. When the aftermath was clipped off or grazed by cattle there was an increase in seed yield the following year (Table 6). This response of Altai wild ryegrass to aftermath removal makes it especially useful for fall and winter pasture. The grower who does not use the aftermath can expect lower seed yields and is wasting valuable pasture.

TABLE 6. Seed yield of Altai wild ryegrass as influenced by aftermath removal

	Seed yield, kg/ha (lb/ac)	
	Clipping study 6-yr mean	Grazing study 6-yr mean
Aftermath removed	62 (55)	124 (111)
Aftermath retained	34 (30)	79 (70)

Altai wild ryegrass is not as susceptible to shattering as Russian wild ryegrass; however, serious shattering losses

can occur if the seed is left until it is ripe. The best time to harvest is when the seed is in the firm-dough stage.

A satisfactory method of harvesting is to swath the crop just above the leafy basal growth and then thresh with a combine several days later. Light crops can be combined directly if care is taken to dry the seed before storage.

Combines equipped with rub-bar cylinders are more suitable for threshing than the tooth cylinder types because they do not break up the straw as much. Correct combine adjustments come by trial and error and vary with the make of machine. To start, adjust the concaves to the same setting as for wheat. If the straw is broken too much so that a great deal of it comes into the hopper with the seed, increase the clearance between the cylinder and the concaves. You may need to open up the concaves as wide as possible. If this does not give the desired effect, slow down the cylinder slightly. Be careful not to slow it too much because this reduces the capacity of the combine and tends to plug it in heavy swaths. Set the adjustable sieves one-third to one-half open. You can find the best setting only by repeated trials. To clean the seed properly slow the fan as much as possible and adjust the wind control doors. With some machines it may be necessary to insert pieces of cardboard to reduce the air intake. Direct the air blast toward the front of the sieves. This provides for better separation and avoids blowing seed over the back of the combine. You may have to slow down the operating speed of the pickup because high speed may cause excessive shattering and seed loss.

The ordinary fanning mill usually cleans the seed well enough to seed through a drill but does not remove all weed seeds. An indent disc separator with appropriate discs is necessary to remove them. If you try to remove all weed seeds with the fanning mill, a lot of good grass seed may be lost. Metal sheet screens are more suitable than wire screens for cleaning grass seed. The wire screens tend to plug up too easily, making it necessary to remove and clean them frequently. Scalping the seed over a 0.6 cm (16/64 in.) round-hole screen will remove about 90% of the inert material. It may be necessary to run the seed through twice to obtain clean seed. The appropriate screen size depends on the quality of the seed. It may be necessary to use screens larger or smaller than those suggested above.

If cleaning equipment is not available on the farm, the seed can be cleaned at a commercial seed cleaning plant. It is best to make the arrangements well before harvest.

Most seed is sold to commercial seed houses. The market for Altai wild ryegrass is not established as yet, although

there have been many enquiries and much interest has been expressed in it. If you grow a large quantity of seed it is advisable to invest in cleaning machinery and clean the seed yourself. If you have a small quantity, it may be marketed through commercial seed houses in uncleaned form. There is a charge for cleaning the seed, and the dockage increases the cost of shipping.

Other helpful information

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CONVERSION FACTORS FOR METRIC SYSTEM

Imperial units	Approximate conversion factor	Results in:
LINEAR		
inch	x 25	millimetre (mm)
foot	x 30	centimetre (cm)
yard	x 0.9	metre (m)
mile	x 1.6	kilometre (km)
AREA		
square inch	x 6.5	square centimetre (cm ²)
square foot	x 0.09	square metre (m ²)
acre	x 0.40	hectare (ha)
VOLUME		
cubic inch	x 16	cubic centimetre (cm ³)
cubic foot	x 28	cubic decimetre (dm ³)
cubic yard	x 0.8	cubic metre (m ³)
fluid ounce	x 28	millilitre (ml)
pint	x 0.57	litre (ℓ)
quart	x 1.1	litre (ℓ)
gallon	x 4.5	litre (ℓ)
bushel	x 0.36	hectolitre (hl)
WEIGHT		
ounce	x 28	gram (g)
pound	x 0.45	kilogram (kg)
short ton (2000 lb)	x 0.9	tonne (t)
TEMPERATURE		
degrees Fahrenheit	(°F-32) x 0.56 or (°F-32) x 5/9	degrees Celsius (°C)
PRESSURE		
pounds per square inch	x 6.9	kilopascal (kPa)
POWER		
horsepower	x 746	watt (W)
	x 0.75	kilowatt (kW)
SPEED		
feet per second	x 0.30	metres per second (m/s)
miles per hour	x 1.6	kilometres per hour (km/h)
AGRICULTURE		
gallons per acre	x 11.23	litres per hectare (ℓ/ha)
quarts per acre	x 2.8	litres per hectare (ℓ/ha)
pints per acre	x 1.4	litres per hectare (ℓ/ha)
fluid ounces per acre	x 70	millilitres per hectare (ml/ha)
tons per acre	x 2.24	tonnes per hectare (t/ha)
pounds per acre	x 1.12	kilograms per hectare (kg/ha)
ounces per acre	x 70	grams per hectare (g/ha)
plants per acre	x 2.47	plants per hectare (plants/ha)

